A story of flasks and flowers:
new perspectives in the search for markers of the mantled somaclonal variation of oil palm

Estelle Jaligot, Wei Yeng Hooi, Frédérique Richaud, Makoussou D.T. Agbessi,
Yen Yen Kwan, Thierry Beulé, Myriam Collin, Emilie Debladis, François Sabot,
Olivier Garsmeur, Angélique D’Hont, Sharifah Shahrul Rabiah Syed Alwee & Alain Rival
CIRAD, UMR DIADE, Montpellier, France

From flask to flower:
the mantled somaclonal variation of oil palm

• Heterogeneous, (slow) reversion
• genome-wide DNA methylation defect (Jaligot et al., 2000)

The hypothesis

• The in vitro cloning process interferes with epigenetic regulations

• Most of these alterations have no detectable impact on the phenotype and/or subside

• The pathway governing floral organ formation remains affected in the adult stage (sensitivity shared amongst Palms?)

The (double) strategy

• In vitro material: investigating the genomic and epigenetic stability during the tissue culture process

• Adult (inflorescence) material: exploring the epigenetic regulation of flower development

The (double) strategy

• In vitro material: investigating the genomic and epigenetic stability during the tissue culture process

Follow-up on the phenotypic stability in the field

• Adult (inflorescence) material: exploring the epigenetic regulation of flower development

The (double) strategy

• In vitro material: investigating the genomic and epigenetic stability during the tissue culture process

Follow-up on the phenotypic stability in the field

Tracing back the origin of the mantled phenotype

• Adult (inflorescence) material: exploring the epigenetic regulation of flower development
The (double) strategy

- *In vitro* material: investigating the genomic and epigenetic stability during the tissue culture process

Follow-up on the phenotypic stability in the field

- Adult (inflorescence) material: exploring the epigenetic regulation of flower development

Investigating the stability of cell cultures

- **Seed-derived palm**
- **Cloning 1**
- **Cloning 2**

1-year propagation, monthly sampling

RNAseq analysis of the suspension transcriptome

- 17 libraries from T₀ and T₆ suspensions
- Illumina sequencing: 520 M reads, 71 Gb

- 53 differentially expressed genes common to both T₀ and T₆
- 47 with consistent expression changes
RNAseq analysis of the suspension transcriptome

The (double) strategy

- **In vitro** material: investigating the genomic and epigenetic stability during the tissue culture process

- Adult (inflorescence) material: exploring the epigenetic regulation of flower development

Exploring flower development regulation

Tracing back the origin of the mantled phenotype

Exploring flower development regulation

Oil palm B orthologues: EgGL02 = PI
EgDEF1 = AP3

A focus on the *EgDEF1* gene

Adam et al, 2007

Jaligot et al, 2014
Does this unusual gene structure have an influence on the methylation or the transcription of the gene?

- Expression changes of the EgDEF1 are not paralleled by methylation changes
- Both retrotransposons are stably repressed, both in normal and mantled conditions

A focus on the *EgDEF1* gene

Jaligot et al, 2014
Perspectives

• The mechanisms underlying the alternative splicing of the EgDEF1 gene need to be further elucidated

• A broader overview of the regulation of flower morphogenesis in the oil palm will be provided by RNAseq analyses

• The study of genome and transcriptome stability in embryogenic suspensions is ongoing

To be continued…

Thank you for your kind attention